



UNITED STATES WELDING CORPORATION

<p align="center">USW ALLOY DESIGNATION AND DESCRIPTION</p>	<p align="center">TURBALOY[®] 140 MC-GRADE GTAW and GMAW SOLID BARE WELDING WIRE IRON BASE</p>	<p align="center">ISSUED JANURAY 2007</p>	<p align="center">DATA SHEET 6469 (19)</p>																																																
<p align="center">CROSS-REFERENCE CONFORMANCE SPECIFICATIONS</p>	<p>AMS 6469 USWC 6469 (V) <i>(Note: see USW 1587 for ER 120S-1 and USW 1580 for ER 100S-1)</i> USW 1392 MIL-140S ER 140S-1 (VM) Many proprietary specifications apply. Type 1 (Bare) Type 2 (Cu Coated) Non-copper coated. 1.75Mn 0.78Cr 2.8Ni 0.85Mo (0.09-0.12C)</p>																																																		
<p align="center">METALLURGICAL BACKGROUND INFORMATION</p>	<p>TURBALOY[®] 140 is produced by vacuum induction melting and remelting techniques and the final wire is produced by special lubricant-free, roller-die forming followed by surface abrasion and cleaning processes. These manufacturing routes ensure consistent metallurgical integrity of the alloy with regard to control of trace elements and physical purity of the welding wire surface.</p> <p>TURBALOY[®] 140 was developed for the fabrication of high strength low alloy ship hulls using GMAW in all positions and to produce acceptable properties in the as-welded condition. The MC-GRADE version enables these objectives to be successfully achieved.</p>																																																		
<p align="center">MATERIALS TO BE WELDED AND APPLICATIONS</p>	<p>HY-80, HY-100, HY-120 hull steels and similar alloys. Optimum toughness and reproducible weld soundness are obtained using GTAW welding, but target values are obtained with GMAW, semi-automatic welding. NOTE: to obtain yield strength values approaching 140,000 p.s.i., the carbon content should remain near 0.11%. Also used for steam turbine repairs. Technical note available.</p>																																																		
<p align="center">WIRE CHEMISTRY WT%</p>	<table border="0"> <tr> <td>Carbon</td> <td>0.09</td> <td>0.12</td> <td>Titanium</td> <td>-</td> <td>0.04</td> </tr> <tr> <td>Manganese</td> <td>1.50</td> <td>2.00</td> <td>Aluminum</td> <td>-</td> <td>0.04</td> </tr> <tr> <td>Silicon</td> <td>0.30</td> <td>0.50</td> <td>Copper</td> <td>-</td> <td>0.15</td> </tr> <tr> <td>Sulfur</td> <td>-</td> <td>0.008</td> <td>Vanadium</td> <td>-</td> <td>0.04</td> </tr> <tr> <td>Phosphorus</td> <td>-</td> <td>0.008</td> <td>Oxygen</td> <td>-</td> <td>0.0025 (25ppm)</td> </tr> <tr> <td>Chromium</td> <td>0.65</td> <td>0.90</td> <td>Nitrogen</td> <td>-</td> <td>0.0050 (50ppm)</td> </tr> <tr> <td>Nickel</td> <td>2.60</td> <td>3.10</td> <td>Hydrogen</td> <td>-</td> <td>0.0003 (3ppm)</td> </tr> <tr> <td>Molybdenum</td> <td>0.70</td> <td>1.00</td> <td>Iron</td> <td></td> <td>Balance</td> </tr> </table> <p>Also specified for TEC; Zr, Sb, Sn, As, Cb, Ta, W.</p>			Carbon	0.09	0.12	Titanium	-	0.04	Manganese	1.50	2.00	Aluminum	-	0.04	Silicon	0.30	0.50	Copper	-	0.15	Sulfur	-	0.008	Vanadium	-	0.04	Phosphorus	-	0.008	Oxygen	-	0.0025 (25ppm)	Chromium	0.65	0.90	Nitrogen	-	0.0050 (50ppm)	Nickel	2.60	3.10	Hydrogen	-	0.0003 (3ppm)	Molybdenum	0.70	1.00	Iron		Balance
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<p align="center">WELD PROPERTIES</p>	<p>Target yield strength 135,000 p.s.i. (min) Density: 7.83 gm/cc NOTE: MC-GRADE wire provides acceptable toughness, strength and ductility using commercial welding practices.</p>																																																		
<p align="center">SIZES AND FORMS AVAILABLE</p>	<table border="0"> <tr> <td align="center" colspan="2">STRAIGHT LENGTHS</td> <td align="center" colspan="2">SPOOLED WIRE</td> </tr> <tr> <td>5 lbs. (2.2kg) packs</td> <td></td> <td>Precision layer wound, with controlled cast and helix</td> <td></td> </tr> <tr> <td>36" (914mm) lengths</td> <td></td> <td>12" (300mm) diameter spools standard</td> <td></td> </tr> <tr> <td>Flag tagged for traceability.</td> <td></td> <td>8" (200mm), 4" (100mm) and proprietary spool sizes</td> <td></td> </tr> <tr> <td>(Double tagging and other lengths on request)</td> <td></td> <td>on request.</td> <td></td> </tr> <tr> <td>Wide range of diameters.</td> <td></td> <td>Wide range of diameters and spool weights.</td> <td></td> </tr> </table>			STRAIGHT LENGTHS		SPOOLED WIRE		5 lbs. (2.2kg) packs		Precision layer wound, with controlled cast and helix		36" (914mm) lengths		12" (300mm) diameter spools standard		Flag tagged for traceability.		8" (200mm), 4" (100mm) and proprietary spool sizes		(Double tagging and other lengths on request)		on request.		Wide range of diameters.		Wide range of diameters and spool weights.																									
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<p align="center">PACKAGING</p>	<p>Sealed, air-evacuated, argon purged Vapor Barrier envelopes with desiccants ensure full protection from atmospheric contamination and prolonged shelf-life.</p>																																																		

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